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Contributions to American Bryology, IV.

NOTES ON THE NORTH AMERICAN SPECIES OF ORTHOTRICHUM—II.

B. Those with immersed stomata.

ORTHOTRICHUM STRANGULATUM Beauv. Prod. 81 (1805). As the "Prodrome des cinquième et sixième familles de L'Æthéogamie, les Mousses, les Lycopodes par A. M. F. J. Palisot-Beauvois," is a rare book and not likely to be consulted by many to verify my statements, I quote the original description in full, especially as the specimens in Schwægrichen's herbarium supposed to be authentic do not agree with the original description:

Orth. *strangulatum;* caule erecto diviso; foliis lanceolatis, costa integra notat is; pyxidibus subimmers is, suborificio strangulatis; calyptra fusca, brevi, cupulæformi.

Cette espèce m'a été envoyée de l'Amérique septentrionale, par le docteur Mühlenberg. Elle ressemble, par ses feuilles a l'*Orth. commune* (*anomalum*); par sa coiffe a l'*Orth. cupulatum;* ses tiges sont plus petites que celles de la première, et toutes ses parties, en général, plus grosses que dans les secondes; mais elle se distingue complètement par son urne, qui, dans la sécheresse, au-dessus de l'espèce d'anneau qui supporte les dentes, est ressérrée et étranglée, ce qui lui donne un peu le port de l'urne des *Splachnum*.

Now the description of the capsules seems to refer to the species to which Sullivant applied the name (Sull. Icon. 57, *t. 36* (1864) a tree species, with double peristome, the teeth united in pairs, and eight cilia, quite distinct from the species which Schwægrichen figured and described in his Supplement (1: ii. 33, *t. 54*

(1816), as any one may see by comparing the figures, and which I have verified by seeing his specimens from the Boissier Herbarium. Not only are the capsules not strangulate, but they belong to the other section of the group of those with immersed stomata, to the rock species to which Beauvois compared them, those with a simple peristome, without cilia, teeth single, striolate, and erect when dry. It seems probable, then, that the types of *O. strangulatum* are not the specimens in the Boissier Herbarium, but must be looked for in the Delessert Herbarium, where I understand that Palisot de Beauvois' specimens are preserved.

ORTHOTRICHUM STRANGULATUM Schwægr. Suppl. 1: ii. 33, *t. 54* (1816).

The specimens used by Schwægrichen to figure for his Supplement were received by me from the Boissier Herbarium, November 24, 1893. The label reads *Orthotrichum strangulatum*, Muhlbg. b. b. a Palisot s. n.

The specimens are abundant and in fine condition. The two upper ones on the right are marked b. b., and are the ones referred to in the label as having been sent to him by Palisot de Beauvois. In two little packets are preserved the peristome, bracts and leaves which were used in making the drawings for *t. 54*, and are correctly represented in the figures, excepting that the teeth are drawn with too many joints, the originals having only 6–8 segments, the three upper being longer than broad, papillose and striolate. In one capsule, from which the lid had just fallen, the teeth were united by a hyaline membrane, forming rudimentary cilia. The teeth are set deep, with an annulus of two rows of thin cells projecting above the rim of the capsule, which is also bordered by three or four rows of darker brown and denser cells. The preperistome, if present, is very difficult to see, though I did not care to examine but one capsule in searching for it. The ridges are broad, of 4–5 rows of cells, with broad spaces between them, and occasionally traces of narrower ridges with colored cells between them. The stomata are immersed, in two rows between the base of the spore-sac and the mouth, they are closed.

The leaves are 2–3 mm. long, the perichætial the longer, with a prominent vein ending below the apex, the upper cells large,

hexagonal, the lower oblong with large, brown auricles at the basal angles, which, however, are difficult to see, as they tear off in dissecting. The margins are revolute and the cells papillose.

All the other characters of the species are correctly represented on table LIV., the short stems, 5–10 mm. high, with brown tomentum at base, the leaves densely crowded above, the capsules immersed, with only the red bordered lid projecting above them, the hairy calyptra, and the cylindric capsule, 1. 5 mm. long, the neck, .5 mm. There are no old empty capsules on these specimens, so that none are strangulate, but one or two are contracted below the mouth when dry.

Even before seeing the specimens I became convinced that the species figured in t. LIV. was the same *O. Porteri*, Austin. The type localities are the same, Lancaster, Pennsylvania. I have compared them macroscopically and microscopically and cannot find any difference between them.

I have also learned through the kindness of Dr. Farlow that Sullivant's copy of Schwægrichen's supplement is annotated as follows:

"LIV. This may be a small form of *O. cupulatum* and probably is what I have in Austin's Musci Appal. called *O. Porteri.* It is clearly not what has long passed among us as *O. strangulatum.* Both Hooker and Wilson have referred to this plate as belonging to *cupulatum.* Bridel, however, thinks differently."

The only reason for doubting whether *O. strangulatum* Beauv. is the same as Schwægrichen figured is the strangulate half-exserted capsule, as it will be seen that none of the other differences are mentioned by Beauvois. It is not impossible that *O. strangulatum*, Beauv., should be *O. Porteri* Aust., for the capsules of the latter are strangulate when old, though less so than *O. strangulatum*, Sull., but as the original description is so emphatic, and the specimens sent to Schwægrichen are none of them strangulate, it seems probable that eleven years after his description was published he might have made a mistake, and sent him a different species. Should it be proven that the specimens in the herbarium of P. de Beauvois agree with those he sent to Schwægrichen as *O. strangulatum*, then this name would have to stand for *O. Porteri* Austin, but in view of the fact that the original description calls for a strangulate capsule, and none of the specimens are strangu-

late, we must maintain this name in the sense in which Sullivant and all subsequent authors have used it. Bridel was the first to apply it to the tree species definitely, for in the Bryologia Universalis (1: 273, 1826) he says, of the habitat of this species:

"In America boreali, arborem, ut e speciminibus a D. Torrey Noveboraco missis corticique adnatis video, nec terrigenum caespitose habitat."

The "nec terrigenum" refers to the habitat given by Schwægrichen in his supplement, where he says, "probabiliter rupestre aut terrigenum." But he cites Schwægrichen's description almost word for word, describing the teeth as sixteen, whereas if the specimens sent him by Dr. Torrey were from trees they must have had eight teeth united in pairs. This does not affect the question of the name, however, though I have sent specimens of *O. strangulatum* Sull. (Beauv.?) and *O. Porteri* to Berlin for comparison with Bridel's specimens.

Braithwaite (Brit. Mosses, 2: 77) cites *O. strangulatum* Beauv. as one of the synonyms of *O. cupulatum* Hoffm. and quotes Schwægrichen's Supplement t. LIV. also for this species. Now it seems to me that tables LIV. and LV. disprove this, for certainly the true differences between *O. cupulatum* Hoffm. and *O. strangulatum* Schwæg. are clearly figured in these two plates and show that as early as 1816 the specific value of *O. Porteri* was recognized, even though all later authors have referred it to *O. cupulatum* as a variety.

ORTHOTRICHUM STELLATUM Brid. Bryol. Univ. 1: 274 (1826).

Since Renauld and Cardot have listed this name in their catalogue of mosses of North America as No. 552, and it has been omitted from all our text-books, it seems of interest to look into the matter, especially as Bridel says:

"*O. strangulato* proximum, et foliis supremis stellatis, ut et peristomii structura et calyptra glaberrima ab eo distinctum.

"Species propria esse videtur.

"In Massachusetts Americae Septrionalis ad arbores habitat. D. Torrey Noveboraco misit."

I have not been able to find any specimens in Dr. Torrey's herbarium labelled *O. stellatum*, nor *O. strangulatum*, but it seems to me the explanation is this: Dr. Torrey sent him the tree species labelled *O. strangulatum*, which on comparison with the descrip-

tion and plate of Schwægrichen's supplement, he saw had 8 teeth, united in pairs, and a calyptra free from hairs, so he called it *O. stellatum*, but described it with a simple peristome. As the cilia are often lacking in old capsules this would be easily explained. It will be seen that his description of *O. strangulatum* called for 16 teeth and a hairy calyptra.

In the Jaeger Herbarium I find an autograph specimen from Müller, collected by T. Boll at Cambridge, Mass., labelled *O. strangulatum*, var. *stellatum*, Brid. These specimens were examined and prove to be like *O. strangulatum* Sull. in every particular except the absence of cilia. The capsules are old and urceolate, and the calyptras are without hairs.

Of course, if it were proven that *O. stellatum* Brid. antedates *O. strangulatum* Sull. it would also antedate *O. Braunii* Br. & Sch. by eleven years, for according to Dr. Venturi (Musc. Gall. 182, 1887) "*L'O. strangulatum* Sull. de l'Amerique du Nord, publié par M. Austin, dans le Musci Appalachiani y correspond parfaitement, de sorte quc je ne doute pas de son identité avec *l'O. Braunii*."

I have sent specimens to Berlin and asked Dr. Paul Hennings to compare Bridel's *O. stellatum* with Boll's specimens and with *O. Porteri*, as well as *O. strangulatum* Sull.

Müller in the Synopsis Muscorum 1: 702 cites *O. strangulatum* with Schwaegrichen's description and Bridel's habitat "In arboribus Muhlenberg primus legit." He cites *O. stellatum* Brid. as a synonym.

Venturi in the Muscologia Gallica (part vi. 171, 1887) says that *O. stellatum* Brid. communicated by Schrader, from North America, is allied to *O. fastigiatum*, and not to *O. strangulatum* Sull., where it has been referred, but that the specimens are too imperfect to be properly recognized. This would seem to indicate that he had seen the type. At any rate as *O. strangulatum* Sull. is a very common species in the Eastern States, and *O. fastigiatum* has only been collected in two localities around Lake Superior as far as we now know, therefore it seems most likely that the alliance indicated by Bridel himself is the correct one. The examination of the stomata alone would determine this, and they may be seen on any old capsules, for *O. fastigiatum* has superficial stomata and *O. strangulatum* Sull. has immersed.

Dr. Venturi says in a recent letter:

"Apropos of the confusion in nomenclature, it is sufficient to note that *O. strangulatum*, which originally was of the group of *Orth. cupulatum*, is in Lesq. and James' Manual identical with *O. Braunii*. In Austin's Musci Appalachiani I am certain that the specimens distributed as *O. strangulatum* are precisely *O. Braunii*, which should maintain its name, though more recent, because the original *O. strangulatum* of P. de Beauvois is a confused species."

As we have already shown, it is not proven that the original specimen of P. de Beauvois did belong to the group of *O. cupulatum*. That the plants figured by Schwaegrichen are *O. Porteri*, there can be no doubt, but the original description throws a doubt on these specimens. We admit that *O. Braunii* would antedate *O. strangulatum* Sull. by nineteen years, but *O. strangulatum* Beauv. if proven to be the same would antedate them both. That it can be proven seems more than probable, and as the herbarium of Palisot de Beauvois is preserved in the Delessert Herbarium at Geneva, I have sent specimens of both species to which the name has been applied, and asked to have them compared with the original specimens sent to Beauvois by Muhlenberg. I have also asked M. Eugene Autran to compare the specimen from the Boissier Herbarium figured by Schwægrichen with the originals.

ORTHOTRICHUM STRANGULATUM, var. Sull. Icon. Suppl. 65, *t.* 47 (1874).

This variety is not referred to in the Manual. It is described by Sullivant as smaller and more rigid than the normal form, the leaves shorter and acute, the margin revolute almost to the apex, capsule oval, broader and less strangulate when dry, sub-exserted, on a long pedicel.

Hab. on trees, Put-in-Bay, Lake Erie.

ORTHOTRICHUM CUPULATUM Hoffm. Deutsch. Fl. 2: 26 (1796).

This species seems to be more rare in North America than has been supposed. After separating out *O. Porteri* and *O. Lescurii* Austin, placing Drummond's No. 152 under *O. nudum*, though the calyptras are lacking in our specimens, and splitting up No. 176 of S. & L. Musci Bor. Am. Ed. 2 into *O. nudum* and *O. Porteri*, there remain only three specimens in our herbarium which agree with *O. cupulatum*. Leiberg's from calcareous ledges around Lake Pend d'Oreille, Idaho, which agree exactly with

Limpricht's Bryotheca Silaesiaca No. 366 cited in his Laubmoose. Macoun's specimens from Arrow Lake, B. C., cited in his Catalogue as *O. nudum* var. *Rudolphianum* are also *O. cupulatum;* and Thos. Howell's collected in Oregon. Macoun's catalogue notes localities in British Columbia and Baffin's Bay. This would seem to indicate a Northern and Western range for *O. cupulatum* and throw it out of our Eastern Handbooks, therefore it is very desirable that more specimens should be collected of this species in order to determine whether it occurs within our limits.

O. SCHIMPERI Hammar, Mon. Orth. Suec. 9 (1852).

O. pumilum Dicks. Pl. Crypt. fasc. 4, 5 (1801) non Sw. (1799).

O. fallax Schimp. Syn. 264 (1860) L. & J. Man, 171 (1884).

Any one who has studied the minute descriptions of Limpricht's Laubmoose, and read Philibert's article on *O. Schimperi* and its allied forms (Rev. Bryol. 33, 1891) will realize that much more study must be given to North American specimens before we can be satisfied that we understand this species and its alliances. The group includes, besides what we have been calling *O. fallax* Sch. *O. strangulatum* (Beauv.?) Sull. *O. Canadense* Br. & Sch. *O. brachytrichum* Sch. and two varieties, *O. strangulatum* var. Sull. and *O. fallax* var. *truncatulum* Aust.

The specimens which Philibert recognizes as typical *O. Schimperi* have a smooth calyptra. American specimens have a few short hairs. Specimens distributed as *O. fallax* Sch. by Limpricht as 129b Bryotheca Silesiaca and Rabenhorst's 125b Bryotheca Europea agree with Philibert's statement that the stomata may be both open and closed on the same capsule. No American specimens that I have seen have the stomata wide open, as described by Limpricht in the Laubmoose. Our specimens also differ somewhat in the color and size of the plants, the shape of the capsule when dry, being less urceolate than European specimens, and the ridges less sharply differentiated and less highly colored, and in the size of the spores! But as they agree in all the main characters, including the very papillose teeth, and especially in the leaves, it seems a refinement of species to separate them. However, it is possible that the American specimens are another species, which

has not been collected since it was described: *Orthotrichum brachytrichum* Sch.

ORTHOTRICHUM BRACHYTRICHUM, Schimp. Proc. Am. Acad. **14**: 140 (1879).

It is always well to distrust a species which has only been collected once, and to seek for the nearest allied species for which it may have been mistaken. After seeing the type of *O. brachytrichum* from Kew, and comparing it with *O. obtusifolium*, with which it had been confounded, I discovered that it belonged to the section with immersed stomata, between *O. Schimperi* and *O. strangulatum*, where it is placed in the Manual. It is so near the former that I am inclined to think they are the same species. The leaves agree in every way, not only in the specimens, but in the descriptions, and so do all the essential characters of the capsules, except that in the types of *O. brachytrichum* is perhaps a trifle longer, with a more tapering neck. The calyptra, as the name implies, has a few short hairs. The ridges of the capsules are broad and conspicuous on the mature capsules, alternating with spaces equal to or narrower than the ridges. The cells which compose them are broad yellow, in 2–5 rows, alternating with 5–6 rows of narrower cells, and agree with the figures given by Limpricht of *O. Schimperi*. The stomata are small and quite closed.

It may be that we shall conclude to call all the American specimens by Schimper's name, but I have sent specimens to both Philibert and Venturi to ask for their opinion and a further comparison with European *Schimperi*.

O. FALLAX var. TRUNCATULUM, Aust. Bull. Torr. Club, **6**: 344 (1879).

Austin lays stress on the leaves being "hyaline apiculate, the capsule cylindric and costate its whole length, abrupt at base with the cilia as long as the teeth." We have examined his type specimens collected in Illinois by Hall at the base of old buildings and find many of the leaves ending in a single clear cell, as figured by Schimper in the Bryologia Europea t. 211. The capsules however are slightly longer than in *O. fallax*, the largest 1. 5 mm. long with the lid, but the truncate base and short neck is quite characteristic of that species as well as of these specimens, and the seta immersed in and shorter than the ochrea which flares out and

embraces the base of the capsule is also quite typical. The cilia are slender as long as the teeth and slightly appendiculate; but this too is found to agree with Limpricht's description of *O. Schimperi.* The calyptra has a few short hairs at apex, and on the whole the specimens agree perhaps better with *O. brachytrichum* than with European specimes of *O. Schimperi.*

ORTHOTRICHUM CANADENSE Br. & Sch. Lond. Journ. Bot. **2**: 667 (1843), non Sullivant's Mosses U. S. 34 (1856).

This species was described from Drummond's North American mosses as follows:

"149–151. *Orthotrichum affine* var. capsulis exsertis, is more nearly related to *O. patens* but differs, however from this species remarkably in its smaller capsules, which are longer pedunculated and in the rusty red-colored teeth of the peristome: it is without doubt a new species, for which we propose the name *O. canadense.* No. 149 differs from 151 only in having longer stems."

We have been favored by the Director of the Royal Botanic Gardens at Kew with the privilege of seeing a portion of the type, which is labeled "*Orthotrichum Canadense* (*O. affine* var.) Ober Canada," and matches Number 151 in our set of Drummond's mosses which is labeled *O. affine* var. capsulis exsertis (an species distincta?), Hab.—Upper Canada, and about Lake Superior; upon trees." It will be seen from the citation of the names and localities that Bruch and Schimper had reference principally to 151, and the characters of the specimens confirm this supposition. They refer to 149 secondarily and seemingly without careful comparison, for our specimens at least are not the same species as 151. The specimens from Kew as well as our 151 are older, and two out of three capsules are without peristome, but the third shows a simple peristome of sixteen striolate teeth, the capsules are exserted and the walls have eight prominent ridges, besides narrower intermediate ones. The stomata are immersed.

I do not know how to account for the intermediate ridges, on a species said to be allied to *O. patens*, for they usually indicate one of the rock species such as *O. anomalum*, but as these capsules are strangulate, smaller, and less exserted than those of that species, and furthermore were said to grow on trees, we must exclude that hypothesis. The separation of the teeth and absence of cilia may be accounted for by age, and indeed Sullivant figures

them separate in the Icones, though I am not certain whether his drawings were made from Drummond's 149 or from Watson's Utah specimens. It is only an inference on my part that the Kew specimens were taken from 151, however. The resemblance of our specimens of 151 to 148 which was distributed as *O. anomalum* is very close, and the specimens are in the same stage of growth, so that it is not impossible that some specimens of the latter may have been mixed with 151 in collecting or distributing.

No. 149 in our set and Prof. Macoun's are another species. They are mature, not in that intermediate stage where the new calyptras are present with old capsules as in 151. They have the lids on in several cases, and the peristome of one of these freshly opened capsules shows the teeth united in pairs, pale white, almost smooth, but with a high magnification (300), the basal part of the teeth is granulose, and the upper segments striolate; they are more or less perforate and divided into three or four parts at apex, and the eight cilia are long and slender, with two rows of cells at base. The ridges are very broad, of 6–8 rows of cells, with very narrow spaces between them, and the stomata are immersed around the base of the spore-sac. The neck tapers into the ochrea, and the seta is short.

ORTHOTRICHUM ALPESTRE var. Sull. Icon. Suppl. 69, *t. 51* (1874).

O. alpestre var. *majus* L. & J. Man. 169 (1884).

O. occidentale James, Expl. 40th Parallel, 402 (1871).

Sulllivant cited Drummond's No. 149 as this species; also Watson's specimens from Utah. He says of it that it differs from the normal form of *O. alpestre* in its greater size, glaucous green color, broader leaves with more reflexed margins, more elongated papillæ, either simple or bifurcating, and the longer and minutely punctulate teeth. In Limpricht's Laubmoose I find that *O. alpestre* is described as an alpine rock species, with the teeth distinctly striolate and perforate, united to apex, cilia 8 of two rows of cells and appendiculate. Drummond's 149 agrees very well with the description, though the teeth are less distinctly striolate than indicated by Limpricht, but the habitat is according to the label, on trees, not on rocks.

Watson's Utah specimens grew on trees also, as shown by the

original specimens, recently seen in the Sullivant herbarium. The Icones cites them as growing on rocks. We sent a portion of 149 to M. Philibert and he says they agree with European specimens of *O. alpestre* in his collection. Specimens collected by R. S. Williams, No. 96 and distributed *O. alpestre* var. *majus*, grew on rocks, in the Belt Mountains, Montana, and were sent to Venturi for comparison. He says they are *O. alpestre*, and the most extreme form he has seen in its differences from *O. stramineum*, to which *O. alpestre* is closely allied.

Noticing that Limpricht cites the locality of this species as on trees and *O. alpestre* on rocks, we tried to refer No. 149 to the former, but we could not find any intermediate cilia.

It will be seen, therefore, that both *O. Canadense* and *O. alpestre*, var. Sull., stand on very uncertain foundations, and require more study to settle the question of their value. *O. Canadense*, especially, based on two numbers of exsiccatæ, which are more or less mixed and imperfect, with such a meagre description, can hardly be said to be a well established species. Prof. Macoun's specimens of No. 151 do not show any intermediate ridges and do not agree exactly with the Kew specimens or with 149; the capsules are older than 149, are less strangulate, and the peristome is gone, so that they do not help us to solve the riddle, and only complicate the question of what is *O. Canadense?*

We have received specimens from Prof. Macoun which agree with 149, but he is uncertain whether he collected them on rocks or trees. They are mixed with *Grimmia apocarpa*, but the label says on trees near Ottawa. It will be noted that No. 149 of Drummond's mosses is cited in the Catalogue as No. 338, *O. alpestre*, (p. 88), and again with 151 as No. 361 *O. Canadense* (p. 92). Mr. Wright informs me that there are specimens at Kew, collected by Prof. Macoun on trees along the Moira at Belleville in 1865, labelled *O. Canadense* by Mitten.

ORTHOTRICHUM TENELLUM Bruch, Brid. Bryol. Univ. 1: 786 (1826).

Specimens collected on trees by J. Dearness, near Ottowa, in May, 1889, are credited to this species in Macoun's catalogue (6, 90). I have seen the specimens and compared them critically with European descriptions and exsiccatæ. They are not *O.*

tenellum, but agree in every way with what we have been calling *O. strangulatum* (Beauv.?) Sull. We have recently received from S. B. Parish specimens collected in California, which do agree with the descriptions and specimens in all but the cilia, and they are not papillose as Limpricht described them. *O. tenellum* is one of the few species of *Orthotrichum*, which have the stomata in the neck of the capsule and not around or above the base of the sporesac, and hence it is readily recognized.

ORTHOTRICHUM PUMILUM, AMERICANUM Vent. Musc. Gall. 180 (1887).

Orthotrichum pumilum Sw. fide Austin Musci App. 165 (1870).

O. fallax Sw. fide Austin, Bull. Torr. Bot. Club, **6**: 344 (1879).

We have examined the specimens in our set of Austin's Musci Appalachiani, and compared his specimens with European specimens of *O. pumilum*. They are not that species, and we have not yet been able to find the specimens that Venturi referred as a variety to *O. pumilum*. The figure given by him indicates that his capsules were much shorter than any European specimens (T. xlix. 15a), and from the following description it would seem as if he had reference to *O. Ohioense*, which I find mixed with our specimens.

"*Var. Americanum:* Tufts small, lax, soft; leaves almost without papillæ, capsule with 8 bands, composed of two series of rectangular cells, feebly differentiated, teeth 8, obtuse perforate along the median line, finely papillose."

I find that Austin was right in citing his 165 as *O. fallax* Sch. (non Sw.) as most of it is that species, and may be readily recognized by its short capsules with abrupt neck immersed in the ochrea, and serrulate leaves. The perforate teeth of *O. Ohioense* gave rise to a manuscript name in Austin's herbarium, *O. perforatum*, which he afterwards published as *O. citrinum*. Sullivant figured *O. Ohioense* with entire teeth.

ORTHOTRICHUM OHIOENSE Sull. & Lesq. Musci Bor. Am. Ed. 2, 181.

Orthotrichum citrinum Aust. Musci App. 170 (1870).

Orthotrichum Ohioense var. *citrinum* (Aust.) L. & J. Man. 171 (1884).

At first sight it would seem desirable to maintain *O. citrinum*

at least as a varietal name, but in carefully examining authentic specimens of Sullivant's and Austin's I found that when they were in their prime, with the capsules mature or just after sporosis, they agreed with *O. Ohioense;* when old and shriveled they agreed with *O. citrinum.* In fact, I found that both were mixed in the same patch, and as in all species of *Orthotrichum* the capsules are very different in different stages, so this seems to be only another instance of the elongation of the neck, and shrinking between the ridges after sporosis. The teeth at first are united in pairs, but later become perforate and then divide. The mouth is bordered by irregular round cells, and the ridges are short, and narrow when the capsule is ripe and inflated, varying from 2–4 rows of cells; the two inner are usually broader and more oblong than the two outer, though all four are usually bright yellow in the mature capsules, and only the two inner turn brown in the old wrinkled capsules. The stomata are very conspicuous in this species, owing to the projection of the cells which surround them and are usually about midway between the base of the spore-sac and the mouth. The calyptra and vaginule are hairy, the ochrea in the mature capsule is longer than the seta and clasps the broad base of the capsule, but with the elongation of the neck and seta it shrinks away.

ORTHOTRICHUM PSILOTHECIUM C. M. & Kindb. Macoun's Cat. 6, 91 (1892).

This species is founded on the slimmest of specimens according to the description, as the authors state that they "have not been able to examine the peristome nor the stomata of the capsule, because only one capsule (in our specimens) is nearly ripe, the others quite unripe."

Now a species of *Orthotrichum* without the stomata described, nor the peristome, is worse than useless, as in this genus the leaves are almost alike in nearly all the species.

We have been favored with a portion of the Rockcliffe specimens by Prof. Macoun, but have not seen the two others cited in the catalogue. The Rockcliffe specimens agree with the description and are still immature as is stated, but we found two old capsules which prove them to be *Orthotrichum strangulatum* Sull. beyond a doubt. The description of the calyptra would indicate

this, but these capsules prove it, for they are constricted below the mouth, with brown ridges and immersed stomata, and reflexed teeth, united in pairs.

ORTHOTRICHUM PUSILLUM Mitt. Journ. Linn. Soc. **8**: 25 (1865).

O. psilocarpum James, Trans. Am. Phil. Soc. **13**: 110 (1869).

From the remarks in the manual it will be seen that James admitted the above synonymy, but took exception to the capsule being described as 8-plicate when dry, yet in consulting his original description I find the following remarks:

"This species differs from *O. Canadense* by the smooth capsule, although at times it appears striate when empty, the capsular walls are nevertheless equal and not at all different at the apparent striæ, which are produced solely by desiccation."

(The *O. Canadense* referred to is not Schimper's of 1843, but Sullivant's of the Mosses of the U. S., page 33, 1856 = *O. Ohioense*.)

On examining S. & L. Musci bor. Am. 180 I find that the walls of the capsules, though generally smooth when dry, do show faint traces of the differentiation of the walls into ridges, and in fact 3–4 rows of cells are often longer, thicker and narrower, alternating with broad spaces of short quadrangular cells.

The original description by Mitten calls for one of Drummond's mosses from Pennsylvania. I find that Number 82 in his second set (1841) distributed as *O. affine* var. *pumilum* contains specimens of *O. psilocarpum* James, mixed with *O. strangulatum* Sull. The description does not cite any number, but this must be the one referred to, as the locality agrees. Sullivant in the Icones Supplement says:

"Mitten's character of *O. pusillum* 'Theca siccitate 8-plicata' does not agree with this species, in which the capsule is neither plicate nor striate. It represents apparently a different species found intermixed with *O. psilocarpum*. Specimens communicated by the English author, however, truly represent this last species."

Now the explanation of that troublesome quotation is that although Mitten made a mistake in describing the capsule of another species, probably *O. strangulatum*, yet most of his description and his specimens show that he recognized his species as distinct. According to the laws of nomenclature, his name must stand, and the main part of his description, for even his mistake is not a bad one, as the capsules are occasionally faintly 8-ribbed when dry.

In some few cases the outlines of the guard cells are visible in this species; one stoma was seen which appeared superficial, all the rest on the same capsule were immersed. Venturi in the Muscologia Gallica says of *O. psilocarpum*, that it is a singular species, which unites the characters and smooth capsule of *O. leiocarpum*, with the section having immersed stomata. In fact it is with *O. striatum* (*O. leiocarpum*) that it is liable to be confounded, but it may readily be distinguished by the absence of the broad erose cilia.

Studies in the Botany of the Southeastern United States—I.

By John K. Small.

(Plates 170, 171.)

Having taken up the flora of the Southeastern United States as a special field of study in this and the papers to follow, entitled *Studies in the Botany of the Southeastern United States*, I intend to put on record facts concerning the plants of that very interesting region not yet made known, with a view to more extended and connected work when the field has been better explored. The papers will include, for the most part, descriptions of and notes on new species and additions to our flora; also remarks on native and introduced plants, facts concerning geographical and altitudinal distribution, and the relations between the geological formations and certain specics. This latter side of botany, much neglected in the past, is exhibited in a striking manner in portions of the Southern States. The sources from which the following contributions are derived are my own collections in the South and the vast amount of material preserved in the Columbia College Herbarium, which includes, besides many types and specimens of the early Southern botanists, the very valuable herbarium of Dr. Chapman, and these sources will be augmented by the collections of local botanists who have promised to coöperate with me.

Asplenium Bradleyi D. C. Eaton, Bull. Torr. Club, 6: 11 (1873).

Contrary to its usual habitat, which is perpendicular or overhanging and rather damp, disintegrating cliffs, Asplenium Brad-

leyi was found growing on horizontal, moss-covered granite rocks at the northern base of Stone Mountain, De Kalb county, Georgia, in April, 1893, altitude 1,000 feet.

Until lately this fern was one of those noted for its restricted geographical and geological range. Now it is seen to have an extensive and interesting distribution. The boundary of its area appears to be from Eastern New York to Kentucky, Tennessee and Arkansas to Middle Georgia, and north to Southeastern Pennsylvania. In Kentucky, Tennessee and Arkansas, the original localities, it was confined to the limestones and sandstones. In Southeastern Pennsylvania, where the best developed and most beautiful specimens have been found, some measuring almost one foot in length, it occurs on the rotting schistose rocks of the Lower Susquehanna Valley. In Middle Georgia we have it from the hard, white granite.

MELIA AZEDERACH L. Sp. Pl. 384 (1753).

"The Pride of India or China-Tree (*Melia Azederach* L.) belongs to an allied order MELIACEÆ." This statement we find in Chapman's Flora of the Southern United States. Having no position assigned to it in the Flora, we infer that at the time of publication this plant had not yet established itself in our country, but was perhaps frequent in cultivation throughout the extreme Southeastern States. Now the species is thoroughly naturalized in Middle and Southern Georgia and very likely in all the surrounding territory. During the past season I collected fruiting specimens near the base of Little Stone Mountain, De Kalb county, and at several localities on the rocky banks of the Yellow River in Gwinnett county. The prevailing common name in Middle Georgia is "China-berry."

BAPTISIA SERENÆ M. A. Curtis, Amer. Journ. Sci. (I.) 7: 406 (1845).

From the general appearance and acccording to Mr. Canby's key to the species of the genus *Baptisia* (Bot. Gaz. 4: 131) my Georgia specimens belong to the above. Heretofore it seems to have been known only from the region about Society Hill, South Carolina, where Mr. Curtis first collected it. While traveling between Toccoa Falls and Tallulah Falls, in Habershan county, Northern Georgia, I found the plant scattered quite plentifully

through the open woods on mountain sides. Before August 8th, all the plants had matured their fruit and no flowers were secured.

AMORPHA VIRGATA n. sp.

Perennial, nearly glabrous, sometimes slightly glaucescent. Stems one or several from a woody base, 1–2 meters tall, erect or nearly so, rather stout, simple or branched only at the summit, wand-like, dark purple-green, more or less channeled, leafy only at the summit; leaves 8–16 cm. long, 6–8 cm. broad, leaflets 11–19, oblong, oblong-ovate or ovate, 2–5 cm. long, 1–2 cm. broad, mostly opposite, on petiolules 2–3 mm. long, emarginate and often apiculate by the excurrent mid-rib, obtuse or cordate, and unsymmetrical at the base, prominently nerved beneath, pubescent about the nerves on the under surface, rather dark but bright green above, brown beneath, very coriaceous and firm; inflorescence consisting of one or several narrow racemes, confined to the summit of the wand-like stems; racemes 8–15 cm. long (in fruit); calyx obconic-campanulate, 3 mm. long (in fruit), pubescent with a few spreading hairs, arranged in quite regular groups of 3–5, the three dorsal teeth acute, the two ventral teeth obtuse and rounded; pedicels short, inclined to separate at the proximal articulation; legume one-seeded, 7 mm. long, 3–4 mm. broad, *straight along the dorsal suture*, much curved along the ventral suture, resinous dotted, dorsal suture distinctly margined; persistent style attached, apparently, above the beak; seed ovoid, laterally compressed, inconspicuously beaked, about one-half as broad as long, with a lateral impression near one or both ends. (Plate 171.)

Found only on the northern and western slopes of Stone Mountain, De Kalb county, Georgia. Fruiting in July. It is apparently restricted to a narrow belt ranging from 1,100–1,200. feet above the sea level, and grows in a few places where the granite rocks are flat enough to hold a layer of sand. A striking species, remarkable in general appearance for its wand-like form, in particular parts for the dry, coriaceous leaves, the straight dorsal edge of the legume, and the single thick, ovoid seed with the impression near one or both ends. *A. fruticosa* is usually much branched throughout, of a lighter green color, with mostly membranaceous leaves, the legume *much curved on the dorsal edge*, with one or two narrowly or linear-oblong seeds, usually marked with an impression near the middle.

AMYGDALUS PERSICA L. Sp. Pl. 472 (1753).

In the past there have been many oversights and even a certain amount of narrowness in regard to foreign plants which have

had a perfect right to become members of our naturalized flora, and which should have been recognized in our botanies. The above-named plant belongs to this class. It has doubtless been naturalized for many years, and now one meets with it throughout the Eastern United States. During the past season it was noticed at numerous localities in Middle Georgia, and was collected on the dry, rocky slopes of Stone Mountain, De Kalb county, early in July, at the altitude of 1,200 feet, well established and producing abundant fruit.

LAGERSTRŒMIA INDICA L. Sp. Pl. Ed. 2, 734 (1762).

This very ornamental shrub has long been cnltivated in gardens from Southern Virginia southward. Dr. Chapman gives it no place in the Southern flora, but prints this note: "The Crape Myrtle (*Lagerstræmia Indica* L.) originally from Eastern Asia, is common in cultivation."* The species is now well established about Stone Mountain, De Kalb county, Georgia, and blooms in the middle part of the State at an elevation of 1,000 feet about the second week in July. This species has long been cultivated in South America, but according to Dr. Morong's observations it has not yet become naturalized in Paraguay.

NYSSA BIFLORA Walt. Fl. Car. 253 (1788).

Grows on the very summit of Stone Mountain, De Kalb county, Georgia, altitude 1,686 feet. It is remarkable that this tree usually confined to the seacoast or seaboard, from Southeastern Virginia southward, should occur in the above situation. There are a number of trees on the small dome-like top of the mountain, and they seem to flourish, although somewhat worn and torn by the heavy winds which sweep by their exposed habitat, and thrive notwithstanding the fact that they grow in but a few inches of sand collected in depressions of the hard granite rock.

GAYLUSSACIA DUMOSA (Andr.) T. & G.; A. Gray, Man. 259 (1848).

In 1891 the geographical and altitudinal range of this "coast" plant received a surprising extension by its discovery on a hillside near Hickory, in Western North Carolina, at an elevation of nearly 2,000 feet. (Mem. Torr. Club, 3: 8.) During the season just past, while exploring in the vicinity of Tallulah Falls, Georgia,

* Flora Southern U. S., 135.

I came upon great quantities of this species growing on the dry sand and quartzite hills north of the deep cañon of the Tallulah River, in Rabun county, at an altitude varying from 1,600 to 1,800 feet. Somewhat later, on a trip to the source of the Tallulah River, it was collected on the lower sandy slopes of the Thomas Bald, a high mountain on the North Carolina and Georgia boundary. There it ranged from 2,500 to 3,000 feet, and was scattered through the forests, at some places in great abundance, and grew vigorously, apparently none the worse for its separation from the influences of the coast.

The first record of the occurrence *Gaylussacia dumosa* at an appreciable distance from the seacoast seems to be in Prof. Porter's Catalogue of the Plants of Lancaster County, Pa. (Mombert's History of Lancaster County, Pa., p. 590). Prof. Porter found it in that section in a swamp, remarkable for its peculiar plant life, near Smithville. Mr. J. J. Carter encountered it somewhat later in a swamp bordering on the Serpentine Barrens, in the southern part of the same county.

The most interesting and striking fact suggested here is this: At the Pennsylvania localities the plant grows in swamps, and at Smithville is actually in the water, whilst in the mountains of North Carolina and Georgia, as far as I have observed, it selects the driest situations afforded.

RUBUS MILLSPAUGHII Britton, Bull. Torr. Club, **18**: 366 (1891).

Grows on the walls of the cañon at Tallulah Falls, Georgia Collected in flower in April, 1893. Altitude 1,600 feet. This most likely locates the southern limit of the geographical range of *R. Millspaughii*. Being a typically high mountain species, it is not to be expected much below 1,600 feet, and just south of the above mentioned locality the Blue Ridge "runs out" into the plains. Further south the land decreases gradually in altitude until the gulf is reached. According to my observations the above plant thrives most vigorously at altitudes ranging from 4,500 to 6,000 feet. It grows well at lower elevations, but never in such a prolific manner.

ERIGERON NEO-MEXICANUS A. Gray, Proc. Amer. Acad. **19**: 2 (1879).

Collected in Burnet county, Texas, in August, 1892, by F. G.

Schaupp. This discovery adds one of the species of the flora of Arizona and New Mexico to that of the Southeastern United States. An interesting leap from the plains of New Mexico to the valley of the Colorado River is Middle Texas.

HIERACIUM SCRIBNERI n. sp.

Annual or perennial, somewhat glaucescent throughout. Stem 4–5 dm. tall, erect, sparingly or diffusely branched above, leafy throughout, glabrous or somewhat pubescent below, with long, spreading, silvery hairs, often glaucous, more or less channeled and flexuous; peduncles and pedicels glabrous or densely glandular; leaves diverse in form, the lowest oblong or oblong-spatulate, 5–8 cm. long, on winged petioles, acute, acuminate at the base, the remaining oblanceolate, oblong, narrowly or linear-lanceolate, 4–12 cm. long, sometimes even fiddle-shaped, sessile or inclined to be decurrent, acute, all nearly glabrous on both surfaces, with a few scattered spine-like teeth, between which on and near the margin are few or numerous spreading silvery hairs; inflorescence more or less corymbose-paniculate; heads large, bright yellow, 2–2½ cm. broad; involucre nearly glabrous or glandular; principal bracts 1 cm. long, linear-subulate, acuminate, sometimes dilated at the base, smaller bracts ½–⅓ shorter; achene columnar, sometimes slightly constricted under the inconspicuous rim at the summit, rather inconspicuously ribbed; ribs barbed upward; pappus not exceeding the involucral bracts, rather light colored. (Plate 172).

Collected on Lookout Mountain, Tennessee, May 21, 1890, by Prof. F. Lamson-Scribner. Notwithstanding the early date the plants are mature and bear plenty of ripe achenes.

The specimens on which the above species is founded were distributed as *Hieracium paniculatum*, which species, however, it does not very closely resemble. It is more nearly related to *H. venosum* or *H. Marianum*, although abundantly distinct from either. From the former species it may be separated on sight by the leafy stem and pappus shorter than the principal involucral scales (in *H. venosum* the pappus is longer than the principal scales of the involucre, an important and striking character which seems to have been overlooked); from *H. Marianum* it differs in the more leafy stem and the usually diffuse, leafy branches.

Plants from Virginia new to Gray's Manual Range, with Notes on other Species.

By A. A. Heller.

Virginia, since its southern boundary is also the southern boundary of our Northern flora, is a state of peculiar interest to the botanist; but notwithstanding this fact very little work has been done in the way of systematic exploration until the last year or two, and the result has been surprising, considering the limited area that has been covered.

My own work during the past summer (1893) was confined principally to its southeastern corner, in the region of Franklin, Southampton county, a town of about 1,500 inhabitants, situated at the head of tidewater on the Blackwater River, and thirty-seven miles west of Norfolk. Several trips were made to the vicinity of Virginia Beach, a resort on the coast, eighteen miles east of Norfolk, and a few to points near Franklin. A few days in May and August were spent in the western part of the State, in Rockingham and Augusta counties.

All that portion of the State lying east of the Blue Ridge as far as the Peaks of Otter, and from there north and west, with the exception of the southeastern corner—and that still needs considerable attention—is practically unexamined.

The following results of a rather hurried summer's work, will show what awaits more thorough scrutiny:

Asplenium ebenoides R. R. Scott, Journ. Roy. Hort. Soc. 87 (1866).

Collected near Mt. Crawford, Rockingham county, on limestone rocks, at an elevation of 1,400 feet. *Asplenium parvulum* and *Camptosorus rhizophyllus* are both plentiful and growing in company. My first impression was that if our plant is a hybrid, a new combination had been discovered. But close scrutiny revealed a withered frond of *A. platyneuron* just above, and almost touching the *A. ebenoides*. Thus another station and state is added to the known geographical distribution of this rare fern.

PANICUM GIBBUM Ell. Bot. S. C. & Ga. 1: 116 (1817).

This southern grass, collected at Virginia Beach, Princess Anne county, by Dr. Britton and Mr. Hollick (Mem. Torr. Club, 2: 54), was again collected there on the 7th of September, on the margin of the pond on the lower side of the railroad. All specimens of this plant which have come under my observation, with one exception, have been collected near the coast. The exception is from Messrs. Beardslee and Kofoid, collected in the Great Smoky Mountains, Swain county, N. C., at an elevation of 1,800 feet.

IRIS GERMANICA L. Sp. Pl. 38 (1753).

This European Iris was collected in a little grassy meadow on the banks of the north fork of the Shenandoah River, about one mile north of Cave Station, Rockingham county, May 13th. It has been there for a number of years, and is well established. The nearest house is about one-fourth of a mile distant.

ANEMONE TRIFOLIA L. Sp. Pl. 540 (1753).

On the peak of Massanutten Mountain, Rockingham county, at an elevation of 2,900 feet, growing in dry rocky ground. This point is about seventy-five miles north of the Peaks of Otter, where members of the Torrey Botanical Club collected the plant several years ago. Collected May 9th. One week later it was found in a dry ravine at White Sulphur Springs, W. Va., at an elevation of about 2,300 feet. The latter situation is less exposed than the former, and the plants more robust.

RANUNCULUS OBLONGIFOLIUS Ell. Bot. S. C. and Ga. 2: 58 (1821).

Collected in Isle of Wight county, near the abutments of the Atlantic and Danville R. R. bridge over the Blackwater River at Franklin. The northern range of this plant is given in the Sixth Edition of Gray's Manual as Illinois and Missouri.

CROTALARIA ROTUNDIFOLIA (Walt.) Poir. in Lam. Encycl. Suppl. 2: 402 (1811).

Anonymos rotundifolia Walt. Fl. Car. 181 (1788).

Crotalaria sagittalis var. *ovalis* Michx. Fl. Bor. Am. 2: 55 (1803).

Crotalaria ovalis Pursh, Fl. Am. Sept. 2: 469 (1814).

In a sandy field about one mile east of Suffolk, Nansemond county. Collected in flower and young fruit, June 8th. Previ-

ously recorded only from the Southern States, Chapman giving its range from North Carolina to Florida.

ZORNIA BRACTEATA (Walt.) Gmelin, Syst. **2**: 1096 (1796).

Anonymos bracteata Walt. Fl. Car. 181 (1788).

Zornia tetraphylla Michx. Fl. Bor. Am. **2**: 76 (1803).

Hedysarum tetraphyllum Poir. in Lam. Encycl. **6**: 405 (1804).

Plentiful in a dry sandy field at Franklin, Southampton county, in the rear of the "peanut factory." Previously cited range, Florida to North Carolina and westward.

MEIBOMIA RHOMBIFOLIA (Ell.) A. M. Vail, Bull. Torr. Bot. Club, **19**: 113 (1892).

Collected at Northwest, Norfolk county, September 6th. The plant is referred to this species with some doubt, but agrees with a glabrous form collected in Louisiana by Dr. Hale.

CYRILLA RACEMIFLORA Walt. Fl. Car. 103 (1788).

Collected on the edge of a swamp at Franklin, Southampton county, June 29th. Also observed at several other localities near the railroad. Known before from the coast region of the Southern States, all the herbarium specimens seen by me being from Florida.

LINUM FLORIDANUM (Planch.) Trelease, Trans. St. Louis Acad. **5**: 13 (1887).

Prof. Trelease doubtfully records this species from S. Illinois. It also appears to be scattered all over Southern Virginia, as it was collected at five different stations, representing the whole southeastern part of Virginia.

LECHEA TORREYI Leggett, Bull. Torr. Club, **6**: 250 (1878).

Hitherto unrecorded from the northern range, this plant grows rather abundantly in a strip of grassy woods between the tracks of the Atlantic and Danville and the narrow gauge railroad, at Suffolk, in company with *L. racemulosa*. It was also collected on the southern boundary of Virginia, near Margarettsville, N. C.

In Isle of Wight county a *Gaylussacia* (No. 992) was collected, which, although related to *G. resinosa*, seems to be distinct. It is seldom more than sixteen inches high, very strict from a creeping base, and the fruit is invariably clustered on the main stem, generally below the leaves. Berry glossy red-black, without bloom, insipid.

A *Vaccinium* (Nos. 980 and 995) does not answer to any of our described species. The two are different in habit, but evidently the same species. No. 995 is a low bush not over a foot high, while 980 is a large spreading bush, with wand-like branches, six or seven feet high. Collected June 14th, near Franklin, in fruit only. Without flowering specimens, I will not venture to assign a specific to either this or the *Gaylussacia*.

VACCINIUM ATROCOCCUM (A. Gray).

Vaccinium corymbosum var. *atrococcum* A. Gray, Man. Ed. 2, 250 (1856).

This plant, long since proved to be a very distinct species, must bear the name given above, all the others with which it has been associated at different times being homonyms.

GALAX APHYLLA L. Sp. Pl. 200 (1753).

We are often surprised at finding coast plants growing upon the higher mountain tops of the South, but here is a reversal of affairs. On June 8th this plant was collected about two miles east of Suffolk, Nansemond county, less than forty miles from the extreme coast line of Virginia. The list of elevations of the N. and W. R. R. give Suffolk as 53 feet above sea level. According to my own observations in the mountains of North Carolina, the plant hardly descends to 2,000 feet, and is most abundant at about 4,000, rarely being found much higher. Wherever *Galax* occurs to any extent, there is a peculiar odor, somewhat suggestive of polecats. This odor was very noticeable at the Suffolk station.

ASCLEPIAS INCARNATA L., forma ALBIFLORA.

In a meadow at Mt. Crawford, Rockingham county, were several plants with white flowers. They were growing at some distance from any having flowers of the ordinary color, and were lower, stouter and more spreading. Altitude, 1,300 feet.

SABBATIA CALYCINA (Lam).

Gentiana calycina Lam. Encycl. 2: 638 (1786).
Chironia dichotoma Walt. Fl. Car. 93 (1788).
Chironia calycosa Michx. Fl. Bor. Am. 1: 147 (1803).
Sabbatia calycosa Pursh, Fl. Am. Sept. 1: 138 (1814).
At Franklin, in swampy ground, but not plentiful.

KOELLIA ALBESCENS (T. and G.) Kuntze, Rev. Gen. Pl. 520 (1891).

Pycnanthemum albescens (T. and G.) Amer. Jour. Sci. **42**: 45 (1842).

Collected in low, sandy ground on the southern boundary of Virginia, near Margarettsville, N. C. "Alabama and Florida and Texas" was its formerly accredited range.

DIANTHERA OVATA Walt. Fl. Car. 63 (1788).

Justicia humilis Michx. Fl. Bor. Am. **1**: 8 (1803).

Rhytiglossa oblongifolia Nees in D. C. Prodr. **11**: 338 (1847).

Rhytiglossa humilis Nees in D. C. Prodr. **11**: 340 (1847).

Dianthera humlis Engelm. and Gray, Bost. Journ. Nat. Hist. **5**: 230 (1845), name only.

In a swamp at Franklin, Southampton county. Collected June 17th, nearly all the specimens being in fruit. Its range, as given, has been "S. Carolina near the coast to Texas." As shown by examination of the Boston Journal of Natural History, in which the Plantæ Lindheimerianæ is published, *Dianthera humilis*, Engelm. and Gray, is a *nomen nudum*, this being all that is said: "159. Dianthera humilis. In clear water. June."

NAMA QUADRIVALVIS (Walt.) Kuntze, Rev. Gen. Pl. 435 (1891).

Hydrolea quadrivalvis Walt. Fl. Car. 110 (1788).

Hydrolea Caroliniana Michx. Fl. Bor. Am. **1**: 177 (1803).

Collected in wet ground on the southern boundary of Virginia (Southampton county), near Margarettsville, N. C., on the northern border of its range, which is given as "N. Carolina to So. Florida and Louisiana?" Kuntze, in his Revisio Generum Plantarum, cites both *quadrivalvis* and *Caroliniana* as distinct species, whereas we have considered them names for the same plant. Michaux in his Flora cites *Hydrolea quadrivalvis*, Walt., as a synonym of his *H. Caroliniana*. If they are two distinct species we do not seem to have the material in this country to substantiate it.

PENTSTEMON SMALLII, n. sp.

Perennial, 1°–4° high; stem simple, leafy throughout, glabrous below, sometimes slightly pubescent above; root-leaves oval or ovate, considerably smaller in proportion than the cauline; cauline leaves opposite, lanceolate or ovate-lanceolate, 2′–5′ long, 1′–3′ wide, sessile, almost connected at the clasping, heart-shaped

base, thin, divaricate, smooth on both sides, serrate with short spreading teeth, or the upper pair almost entire; inflorescence an open thyrsus, secund, the long peduncles as well as the pedicels and lanceolate bracts more or less glandular-pubescent; pedicels as long or slightly longer than the capsule; calyx-lobes lanceolate, half to two-thirds the length of the tube of the corolla, usually somewhat pubescent or glandular, scarious-margined; corolla large, 1¼′ long, ½′ or more wide, bright pink purple, with whitish stripes on the inside, abruptly tubular-campanulate above the tube proper, gibbous on the upper side, sometimes resinous-dotted, the upper lip entire, a third shorter than the three-lobed lower one; lower lip densely bearded within with yellow hairs, especially above; sterile stamen bearded to the base with yellow hairs, very densely so above; capsule ovate, mucronate, tipped by the stiff base of the persistent style, which in dehiscence splits into four parts, each tipping a segment of the capsule.

Collected by the writer on Blowing Rock Mountain, Caldwell county, N. C., July 21, 1890, at an elevation of 4,000 feet. Only two or three flowers were seen, but good fruiting specimens obtained. Early in June, 1891, the locality was again visited in company with Mr. John K. Small, to whom the plant is dedicated.* A few plants were also observed at one place along the road between Blowing Rock and Linville. Fresh specimens were again obtained at Blowing Rock during the past summer. Mr. Thomas Hogg has collected it at Asheville, N. C., and Prof. F. Lamson-Scribner at Knoxville, Tenn., where it grows from crevices of rocks along the river banks.

UTRICULARIA JUNCEA Vahl, Enum. 1: 202 (1804).

Utricularia personata LeConte, Ann. Lyc. N. Y. 1: 77 (1824).

Collected August 22d, in wet ground a short distance from the beach, just north of the Life Saving Station south of Virginia Beach, Princess Anne county. Its cited range is from "E. North Carolina to Texas."

SOLIDAGO MONTICOLA T. and G.; Chapm. Fl. S. States 209 (1860).

This has been considered a rare plant, and specimens are rare in herbaria. In Western Virginia, on Mt. Rogers (Elliott's Knob) Augusta county, it is very plentiful, ranging from 2,000 feet at the foot to 4,000 near the summit. It is most plentiful between 3,500 and 4,000 feet, and was not found on the summit, which is

* Mem. Torr. Bot. Club, iii. No. 1, 4 (1892).

4,473 feet above sea. In western North Carolina it was observed from elevations of 2,000 to 4,000 feet. It was confined, as far as noticed, to edges of woods and thinly timbered woods, where the underbrush is scattered. On Elliott's Knob, at the places where it is most plentiful, the woody growth is composed almost entirely of *Vaccinium Pennsylvanicum* and a stunted form of *Quercus ilicifolia* about two feet high.

SOLIDAGO BUCKLEYI, T. and G. Fl. N. A. **2**: 198 (1841).

This is one of the most interesting additions to the northern flora. Collected on the Peak of Massanutten Mountain, Rockingham county, August 15th, altitude 2,900 feet. It is abundant, but only on the backbone of the ridge, and very little of it was in flower at that time. Associated with it was a slender, almost glabrous form of *S. bicolor*.

HELENIUM TENUIFOLIUM Nutt. Journ. Acad. Nat. Sci. Phila. **7**: 66 (1834).

Collected at Norfolk, September 23, 1892, where there was quite a patch of it near the N. and W. yards. A few plants were observed early in the past summer, but none collected. Its first appearance so far north and east.

New or noteworthy North American Phanerogams—VIII.

BY N. L. BRITTON.

(PLATE 173.)

PICEA RUBRA (Lamb.) Link, Linnæa, **15**: 52 (1841).

I have lately been much interested in the Spruces, and have observed them closely on the Blue Ridge in Southwestern Virginia, where I became familiar with two species, one of which I supposed to be the White Spruce, *Picea Canadensis*. The same two species occur on the slopes of Mounts Marcy and McIntyre, in the Adirondacks, but neither of them is *P. Canadensis*, which species I did not see. It is reported from Northern New York, but I did not encounter it.

The two species of the Blue Ridge and the Central Adirondacks are the Black Spruce, *P. Mariana*, and the Red Spruce, *P.*

rubra. By most recent authors the latter has been regarded as a variety of the former, but this view has been ably attacked by Prof. George Lawson in a paper on "Remarks on the Distinctive Characters of the Canadian Spruces," published, I think, in 1888. He there maintains that the Red Spruce is distinct from the Black, and I am in entire accord with this opinion. The White Spruce is very different from either of the others by its elongated cones, entirely glabrous and glaucous twigs and sterigmata, and very light green leaves. *P. rubra* differs from *P. Mariana* by its very slender twigs, which are sparingly pubescent, the sterigmata nearly or quite glabrous, its very slender light-green, nearly straight, very acute leaves, and its oblong cones, which are deciduous at the end of the season, the scales lacerate or 2-lobed. *P. Mariana* has stout, very pubescent twigs and sterigmata, stout and thick, merely mucronate, dark green, incurved leaves, and ovate, larger cones, which are persistent for two or more years, their scales entire or merely erose. *P. rubra*, according to my observations, reaches a much greater altitude on McIntyre than does *P. Mariana*, and this agrees with our collections in the Blue Ridge of Virginia. The very slender twigs of *P. rubra* and its light green leaves give it a much more graceful aspect than is exhibited by *P. Mariana*.

CYPERUS RIVULARIS Kunth, Enum. 2: 6 (1837).

Cyperus diandrus var. (?) *castaneus* Torr. Ann. Lyc. N. Y. 3: 252 (1836).

Having recently had occasion to reëxamine certain species of the genus *Cyperus*, in view of the publication of the new List of Northeastern American plants, prepared for the Botanical Club of the American Association for the Advancement of Science, I conclude that this plant is specifically distinct from *C. diandrus*, Torr. I am strengthened in this view by a note received from Mr. Coville in May, 1890, in which he emphasizes the characters adduced by Torrey in 1836. These are concisely as follows:

C. rivularis: Scales of the spikelets firm, smooth, shining; styles not at all or scarcely exserted.

C. diandrus: Scales membranaceous, usually slightly wrinkled, dull; styles conspicuously exserted.

The color of the scales varies in both species from light green to dark brown, and hence cannot be relied on for a character.

Mr. Clarke, in his paper on the Cyperaceæ of the Calcutta Herbarium maintains the two as species, but I had never been able to come to this view until I had critically observed the plants growing.

CYPERUS PSEUDOVEGETUS Steud. Syn. Pl. Cyp. 24 (1855).

Cyperus virens A. Gray, Man. Ed. 2, 493 (1856), not Michx.

Cyperus Luzulæ, var. *umbellulatus* Britton, Bull. Torr. Club, **13**: 208 (1886).

Cyperus calcaratus Nees; S. Wats. in A. Gray, Man. Ed. 6, 570 (1890).

This is clearly the synonymy of the common marsh *Cyperus* of the Southeastern United States, which I took to be a variety of the Tropical American *C. Luzulæ* Rottb. The name *calcaratus* first appears in print by Bœckeler (Linnæa, **35**: 558 (1867–68)), where it is cited as a synonym of *C. arenicola* Steud. Mr. Clarke writes me that he has seen Steudel's type of this plant, and that it is exactly *C. reflexus* Vahl. Whether the *calcaratus* of Nees (1867–68) is the same as the *calcaratus* of Watson (1890) or a different plant, I am unable to say, but it does not affect the name, Steudel's *pseudovegetus* being much older.

DULICHIUM ARUNDINACEUM (L.) is the older name for *D. spathaceum* (L.) Pers. the synonymy being as follows:

Cyperus arundinacea L. Sp. Pl. 44 (1753).

Schœnus spathaceus L. Sp. Pl. Ed. 2, 63 (1762).

Cyperus spathaceus L. Syst. Ed. 12, **2**: 735 (1767).

The genus STENOPHYLLUS Raf. Neog. 4 (1825).

I have previously remarked on this generic name*, which is based on *Scirpus stenophyllus* Ell., noting that Mr. C. B. Clarke had proposed taking up Kunth's *Bulbostylis* (Enum. 2: 205 (1837) as a valid genus and that Rafinesque's name had twelve years priority. I am now prepared to maintain the view that the plants of which *Scirpus stenophyllus* is the type are generically distinct from both *Scirpus* and *Fimbristylis*, differing in the characters pointed out by Kunth in 1837, i. e. in *Stenophyllus* the bulbous base of the style

* Bulletin **18**: 370 (1891).

persists on the summit of the achenium, and that the leaves are usually filiform and their sheaths ciliate. The persistent bulbous base of the style is the crucial character.

The North American species known to me are as follows:

I. Spikes capitate.

a. Scales of the spikelets long-cuspidate.

1. STENOPHYLLUS STENOPHYLLUS (Ell.).

Scirpus stenophyllus Ell. Bot. S. C. and Ga. **1**: 88 (1816).
Dichroma cæspitosa Muhl. Gram. 14 (1817).
Dichromena cæspitosa Spreng. Syst. **1**: 202 (1825).
Stenophyllus cæspitosus Raf. Neog. 4 (1825).
Isolepis stenophyllus Torr. Ann. Lyc. N. Y. **3**: 353 (1836).
Scirpus barbatus var. *Americanus* Bœckl. Linnæa, **36**: 752 (1870).

North Carolina to Florida and Louisiana.

b. Scales of the spikelets obtuse.

2. STENOPHYLLUS WAREI (Torr.).

Isolepis Warei Torr. Ann. Lyc. N. Y. **3**: 353 (1836).

Florida (Ware, Garber, Chapman, A. H. Curtiss No. 3135).

II. Spikes umbellate (sometimes solitary in depauperate forms).

3. STENOPHYLLUS CAPILLARIS (L.).

Scirpus capillaris L. Sp. Pl. 49 (1753).
Isolepis capillaris R. & S. Syst. **2**: 118 (1817).
Scirpus ciliatifolius Ell. Bot. S. C. and Ga. **1**: 82 (1816).
Isolepis ciliatifolius Torr. Ann. Lyc. N. Y. **3**; 352 (1836).

Throughout nearly the whole of North America except the extreme north.

4. STENOPHYLLUS CAPILLARIS COARCTATUS (Ell.).

Scirpus coarctatus Ell. Bot. S. C. and Ga. **1**: 83 (1816).
Isolepis coarctata Torr. Ann. Lyc. N. Y. **3**: 352 (1836).
Fimbristylis capillaris var. *coarctata* Britton, Bull. Torr. Club, **15**: 102 (1888).

Georgia and Florida.

III. Spikes solitary, terminal; fertile flowers borne also at the base of the culms.

5. STENOPHYLLUS FUNCKII (Steud.).

Isolepis Funckii Steud. Syn. Pl. Cyp. 91 (1855).
Scirpus heterocarpus S. Wats. Proc. Amer. Acad. **18**: 171 (1883).

Arizona (Pringle); Chihuahua (Pringle, No. 1398); Mexico (Pringle, No. 3436); Jalisco (Pringle, No. 3428); Orizaba (Botteri); Bolivia (Mandon, 1410).

POTENTILLA PARADOXA Nutt.

This plant occurs in large quantities at the station long known for it near the outlet of Braddock's Bay, just east of Manitou Beach, Lake Ontario, N. Y. It differs from the European *P. supina*, L., in its stouter habit, larger flowers, thicker and less deeply dentate leaf-segments. The species, whose centre of distribution lies somewhere west of the Mississippi, is one of a considerable number of plants of similar range which extend eastward through the region of the Great Lakes and St. Lawrence River. Among these may be mentioned *Eleocharis acuminata*, which occurs as far east as Anticosti, *Corispermum hyssopifolium*, *Polygonum Hartwrightii* and *Vaccinium ovalifolium* which Prof. Macoun reports from Quebec.

GALIUM KAMPTSCHATICUM Steller.

This is among the species collected by me on the slopes of Mt. Marcy, N. Y., at elevations from 2,000 to 4,000 feet, in the autumn of 1892. I found but a single patch containing several hundred plants along the trail from Adirondack Lodge to the summit of Marcy at about 3,500 feet altitude. This was not unexpected, for a scrap of this species has long been in our herbarium bearing the label "Indian Pass, near McIntire's, W. F. Macræ, August 13, 1839." I found the plant in very old fruit and secured only a few good specimens. In this condition its elongated pedicels distinguished it readily from any form of *G. circæzans* Michx. to which it has been referred by some authors as a variety.

The plant of Oregon and Washington, which was regarded as con-specific with this by Dr. Gray, appears to me distinct from this and also from *G. circæzans*.*

Mr. Peck has recently collected specimens of a form of *G. circæzans* with perfectly glabrous corolla near Whitehall, N. Y.,

*GALIUM OREGANUM, n. sp. Leaves oblong, ovate-oblong or ovate, acute or acutish or the lowest obtuse, ciliate on the margins and usually also on the upper side of the nerves; corolla glabrous; fruit shorter-pedicelled than that of *G. Kamptschaticum*, and twice as large when ripe. Characters based on a specimen of Howell's Oregon collections, Suksdorf's 864 from Skamania county, Washington, and Piper's 921 from Mason county, Washington. The obovate obtuse leaves sprinkled with short hairs on the upper surface of the *G. Kamptschaticum* of the Adirondacks White Mountains and Lower Canada appear to be perfectly constant.

which is a good deal more like *G. Oreganum* than is *G. Kamptschaticum*. I propose to distinguish this as *G. circæzans glabrum*.*

Meehania: A proposed new Genus of Labiatæ.

(Plate 173.)

The genus *Cedronella* Mœnch, Meth. 411 (1794) is based on a tall, perennial herb of the Canaries and Madeira, the *Dracocephalum Canariense* L. Sp. Pl. 594; *Cedronella triphylla* Mœnch, loc. cit. It was taken up by Bentham (Lab. Gen. et Sp. 501–502 (1834)) and two American species added: *C. cordata*, based on *Dracocephalum cordatum* Nutt. Gen. 2: 35 and *C. Mexicana*, based on *Dracocephalum Mexicaum* H. B. K. Nov. Gen. et Sp. 2: 322, *t. 160*. It has since been further augmented by Mexican and Arizona species described by Lindley, A. Gray and Greene.

Cedronella cordata is a local herb of Eastern North America, ranging through the central and southern Alleghanian region, and is one of the most beautiful of our native Labiates. It is so entirely different in habit and aspect from the typical species and from those of the Southwest, and has such a limited geographical distribution, that it has long seemed to me to represent a distinct generic type, and recent comparative study has convinced me that this position can readily be maintained.

The typical species of the Atlantic islands is an erect fruticose herb with 3-foliolate leaves, or the lower sometimes with the lateral leaflets 2-parted. The verticillate clusters are many-flowered and crowded in dense round spikes. The calyx is tubular-oblong, its teeth lance-acuminate, almost subulate-tipped and nearly equal. The corolla has a narrow tube abruptly dilated above the calyx into a short throat.

The Alleghanian plant is a low, straggling herb producing long, slender, leafy stolons, the leaves simple, cordate. The clusters are but 1–3-flowered in loose, secund spikes. The calyx is distinctly campanulate and 2-lipped, the 3 teeth of the upper lip

* Galium circæzans glabrum, n. var. Glabrous except the ciliate-margined leaves with sparingly pubescent upper surfaces. Leaves oblong, obtuse; corolla glabrous; flowers very nearly sessile; fruit not seen. Near Whitehall, N. Y., C. H. Peck, July, 1892.

decidedly longer than the 2 lower. The corolla expands from below the top of the calyx into a very large open throat, and is pubescent within.

There is no close congener known, the genus which I here propose being monotypic. The Arizona-Mexican plants referred to *Cedronella* (*C. Mexicana* (H. B. K.) Benth, *C. pallida* Lindl., *C. aurantiaca* A. Gray, *C. parviflora* A. Gray, *C. coccinea* Greene) have no more characters in common with *C. cordata* than has the typical species. They form a natural group, differing from both the others in their narrow, tubular corollas, scarcely at all ampliate above and by their conspicuously exserted stamens.

Meehania is dedicated to Thomas Meehan, a life-long student of plants and a liberal patron of science, who has contributed important and valuable information on systematic and physiological botany for a long period of years.

Meehania Britton.

A low, pubescent, spreading or decumbent herb with long-petioled, cordate leaves, trailing, leafy stolons and large, blue flowers in terminal, secund, bracted spikes. Calyx campanulate, 15-nerved, 2-lipped, its teeth all lanceolate, acute, the 3 upper longer and slightly narrower than the 2 lower. Corolla much exserted, puberulent without, pubescent within, the tube narrow at the base, gradually widely ampliate above, the limb 2-lipped; upper lip 2-lobed, arched, about as long as the lower, the lobes ovate, obtuse; lower lip spreading, 3-lobed, the middle lobe emarginate, broader than the lateral ones. Stamens 4, didynamous, all antheriferous, ascending under the upper lip, the upper pair somewhat longer than the lower. Anthers 2-celled, the sacs parallel. Ovary deeply 4-parted. Style equally 2-cleft at the summit. Nutlets oblong, smooth.

A monotypic genus of eastern North America.

Meehania cordata (Nutt).

Dracocephalum cordatum Nutt. Gen. **2**: 35 (1818).

Cedronella cordata Benth. Lab. 502 (1834).

Flowering stems ascending, 3′–8′ high. Stolons very slender, leafy throughout, sometimes rooting at the nodes, 1–2 ft. long; leaves all broadly ovate or ovate-orbicular, obtuse or sub-acute at the apex, crenate all around, cordate at the base, sparingly pubescent with scattered hairs on both surfaces or almost glabrous beneath, green on both sides, 1′–2′ long, the basal sinus broad; spikes 1′–4′ long; bracts ovate or oblong, acute, membranaceous, the lowest

sometimes crenulate; bractlets small, lanceolate; calyx about 5′ long, equalling or longer than the bracts, puberulent, its longer teeth about one-half the length of the tube; corolla about 1′ long, showy.

In rich moist woods and thickets, Western Pennsylvania to Tennessee, Virginia and North Carolina. May–July.

The Genus Hemicarpha in North America.

By Frederick Vernon Coville.

The genus *Hemicarpha* was published by Nees von Esenbeck in the year 1834,* based upon the species *isolepis*. The genus is now accredited with three species, *H. isolepsis*, *H. micrantha*, and *H. occidentalis*, the last of which is restricted to the Pacific coast region of the United States, while the other two are widely distributed over the earth, centering in the tropical or subtropical portions of both hemispheres. At the request of Dr. N. L. Britton, the writer presents the following account of the North American species.

Hemicarpha Micrantha (Vahl) Britton.

Scirpus micranthus Vahl, Enum. Pl. **2**: 254 (1806). Type locality given doubtfully as South America.

Scirpus subsquarrosus Muhl. Gram. 39 (1817). Type specimen found on the Susquehanna river, Pennsylvania.

Isolepis micrantha R. & S. Syst. Veg. **2**: 110 (1817). Type specimen the same as that of *Scirpus micranthus*.

Isolepis subsquarrosa Schrad. in Schultes, Mant. **2**: 64 (1824). Type specimen the same as that of *Scirpus subsquarrosus*.

Hemicarpha subsquarrosa Nees, in Martius Fl. Bras. **2**: part i. 61, *t. iv. fig. 1* (1842). Type locality the same as that of *Scirpus subsquarrosus*.

Hemicarpha Drummondii Nees, in Martius Fl. Bras. **2**: part i. 62 (1842). Type specimen collected by Drummond near St. Louis, Missouri.

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* Linnæa, **9**: 287 (1834).

Hemicarpha micrantha Britton, Bull. Torr. Club, xiv. 104 (1888).

Type specimen the same as that of *Scirpus micranthus*.

Plant annual, with fibrous roots, glabrous throughout; stems closely tufted, slender, erect, or in the smaller, more broadly tufted plants recurved-spreading, 2.5 to 20 cm. high, simple, terete, glabrous, striate, nodeless; radical leaves 1 or 2, the upper with a membranaceous, purplish or brownish sheath 4 to 20 mm. long, closed to near the apex, the blade 25 mm. or less in length, sometimes obsolete, flat and 0.5 mm. wide, or much narrower and filiform; lower leaf reduced to a bladeless sheath similar to the upper, but smaller, or entirely wanting; inflorescence a cluster of 1 to 3 (usually 2) spikes at the apex of the stem, each subtended by a leaf; lowest leaf of the inflorescence erect, appearing like a continuation of the stem, commonly 5 to 20 mm. long (rarely in slender specimens reaching 100 mm.), the short, half-clasping base with membranaceous margins, the blade similar to that of the radical leaf; second and third involucral leaves similar to the lowest, but much smaller and divergent; spikes sessile, ovate to ovate-lanceolate, commonly 2 to 3 mm. (rarely 5 mm.) in length, usually acute, bearing innumerable scales on a cylindrical axis; bractlet about 1 mm. long, brown, with a green excurrent midrib, oblong-obovate, abruptly acute; perianth consisting of a single, minute, obsolescent, hyaline scale opposite the bractlet, discernible only in the flowering spike; stamen 1, opposite the axis of the spike; pistil with a well-defined style and 2 spreading, filiform stigmas; achenium brown, rarely black, subterete, clavate to narrowly oblong-obovate, 0.6 to 0.8 mm. long, the color half obscured by the air-filled, minutely and regularly cellular-punctate outer seed-coat.

This plant has a wide distribution on our continent, occurring in both North and South America. Specimens have been examined by the writer from Massachusetts, Rhode Island, New York, Pennsylvania, Wisconsin, Michigan, Kentucky, Florida, Nebraska, Indian Territory, Texas, New Mexico, Arizona, Washington, California, Mexico, Guatemela and Brazil. As might be expected of a plant of such broad range, it shows marked variation, but in all those specimens which we have referred to the type form of the species, this variation appears to be essentially one of size and external form. The plant of the Gulf and southern Atlantic states is commonly 5 to 10 cm. high and nearly erect. Toward the northern limit of its range, both in the state of Washington, on the Pacific coast; in Wisconsin, in the interior of the country; and in New England, on the Atlantic coast, the specimens become

smaller in stature, commonly not exceeding 3 cm. in height, sometimes reduced even to 1 cm., while the stems assume a recurved-spreading position. A similar modification of size and habit occasionally appears in other parts of the continent, apparently due to an environment whose essential character is a reduction of the full amount of moisture habitually required by the species.

In Kansas, Texas, New Mexico and Northern Mexico occurs abundantly a form the principal character of which is its unusual height, 15 to 20 cm. This is the plant which was called by Nees von Esenbeck *Hemicarpha drummondii*. But it does not seem desirable to retain this as a varietal name, since these specimens do not appear distinguishable from individual large specimens of the type form collected in localities far removed from this region. Another related form, however, confined so far as known to Texas and Kansas, possesses additional characters and requires varietal separation.

HEMICARPHA MICRANTHA ARISTULATA var. nov.

Plant erect, the tufts 9 to 20 cm. high; spikes 1 or 2, at maturity 2.5 to 5 mm. long, made conspicuously squarrose by the awns of the bractlets; bractlets about 1.5 mm. in length, narrowly rhombic-obovate, abruptly contracted into a stout, green, spreading awn nearly as long as the body of the scale; achenium black, marked as in the type form.

Type specimen in the United States National Herbarium, collected in the year 1888, in Texas, by Mr. G. C. Nealley.

The leading character of this plant, as indicated by its varietal name, is the spreading awns of its bractlets, which give the spikes a conspicuously squarrose appearance. Its large size and black instead of brown achenia serve also to distinguish it, since black achenia occur but rarely in the type form of the species. This variety was collected also in Kingman county, Kansas, in September, 1891, by Mr. M. A. Carlton. It seems to intergrade with the type form through specimens collected in the Southern Great Plains region.

HEMICARPHA OCCIDENTALIS A. Gray.

Hemicarpha occidentalis A. Gray, Proc. Amer. Acad. 7: 391 (1868). Type specimen collected in Yosemite Valley, California, by Mr. H. N. Bolander.

Plant 1–4 cm. high, the stems erect or spreading; radical leaf with blade 5–20 mm. long, its sheath 2–5 mm. long; lowest leaf of the inflorescence 10 mm. or less in length; spike 1, rarely 2, broadly ovate in outline, 3–4 mm. long, squarrose or even hystricine; scales about 2 mm. long, narrowly lanceolate, the narrow, hyaline margins barely brownish, tapering gradually into the long, spreading awn; achenium brown, its form and surface as in the type form of *Hemicarpha micrantha.*

This species exhibits no tendency toward intergradation with *H. micrantha*, and is readily distinguishable from that plant by its broad, bristly spikes, and narrow, long-awned scales. Specimens have been examined by the writer from the type locality, and from Falcon Valley, in the State of Washington.

Two new Grasses.

By F. Lamson-Scribner.

PANICULARIA LAXA sp. nov.

A coarse leafy grass, 2–4 ft. high, with a diffuse ample panicle and oblong, somewhat turgid spikelets. Sheaths scabrous, the lower exceeding the internodes. Ligule about 1 line long, thin, lacerate. Leaves 8–15 in. long, 3–4 lines wide, very rough-scabrous both sides tapering to a sharp point or the lower ones abruptly sharp-pointed. Panicle 7–9 in. long, the main axis and branches strongly scabrous, lower branches in 2s or 3s the upper solitary, the longer and usually widely spreading lower ones 3–5 in. long. Spikelets oblong or broadly ovate, 3–5-flowered, about 2 lines long, much exceeding the pedicels, and from 1–1½ lines wide. Empty glumes unequal, scarious-margined, the larger second glume about ½ the length of the first floret. Flowering glumes rounded on the back, 1–1¼ lines long, broadly obovate, obtuse, with a narrow scarious margin above, 7-nerved, nerves not prominent. Palea nearly equalling the glume, the keels smooth, strongly curved above.

Closely allied to *P. Canadensis*, but the smaller spikelets are green or purple-tinged, and the more obtuse floral glume scarcely exceeds the narrower palea.

Mt. Desert, Maine. J. H. Redfield and E. L. Rand. What appears to be a form of this species with smaller and imperfectly developed spikelets comes from New Jersey, Dr. H. H. Rusby, collector. We have this same form also from Mt. Desert.

POA CHAPMANIANA Scribn. (*P. cristata* Chapm. not Walter).

A strict, erect annual grass, 3–6 inches high. Leaves ½–1 inch long, a line or less wide, erect or spreading, conduplicate, at least when dry; sheaths firm, closely surrounding the culm, striate, mostly shorter than the internodes, purplish near the base. Panicle generally narrow, occasionally some of the branches more or less spreading. Spikelets ovate, about 1½ lines long, 3–6-flowered. Empty glumes nearly equal, ovate-lanceolate, acute, the second and often the first 3-nerved, distinctly scabrous on the keels above. Flowering glume ovate, rather obtuse, 3-nerved (the nerve between the marginal nerve and keel obsolete), the nerves silky villous for nearly their entire length, and at the base there is a small tuft of cob-webby hairs, which when extended exceed the length of the glume.

Allied to *Poa annua*, but the narrower, conduplicate and shorter leaves, narrower panicle, and tuft of long cob-webby hairs at base of the flowering glumes which are apparently only 3-nerved, are characters which clearly separate it from that species.

In making a new name for this grass I assume that Elliott was correct in reducing *P. cristata* Walt. to *Poa rigida* L. (*Glyceria rigida* Smith. *Festuca rigida* Kunth).

Nashville (Dr. A. Gattinger); along the Tennessee River below Knoxville (Scribner); St. Louis, Mo. (Hitchcock); Florida (Chapman).

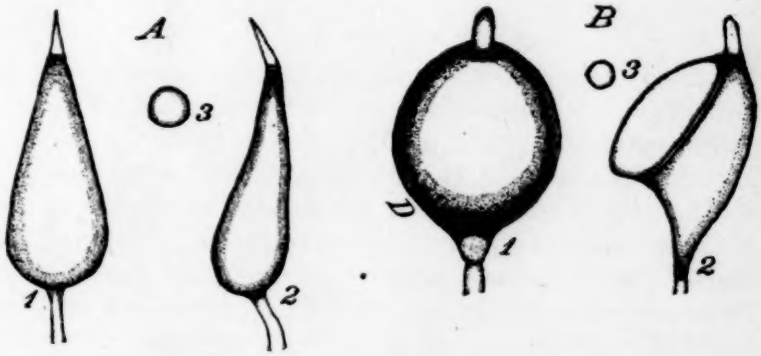
Botanical Notes.

Buxbaumia indusiata Bridel in Central New York.—On October 13, 1893, I was collecting in Enfield ravine, a large glen about eight miles from Ithaca. While examining a rotten log for liverworts, I noticed a capsule of a *Buxbaumia*. The circumstance was a surprise to me, as I at that time did not recollect having before seen a *Buxbaumia* growing on a log. The form and shape of the capsule were also peculiar. I had collected *B. aphylla* in several places, but never before had seen one that looked like this. A careful search revealed about fifteen capsules, which were growing singly about the log. They were not quite mature, but nearly enough so to show all essential parts.

Several days later, in thinking the matter over, I recollected having seen in a number of the BULLETIN an article on *Buxbaumia*

indusiata Bridel, by Professor D. C. Eaton. The description of this species there given (Vol. 17: p. 126, 1890), fitted my specimens exactly, so that I was convinced that I had found this rare plant. Moreover, the single plant of *Buxbaumia indusiata*, in Mougeot and Nestler's "Stirp. Crypt. Vogeso-Rhenanæ," number 724, in the Herbarium of Cornell University, is, externally, almost exactly similar to my specimens. All doubt as to the identity of my plants were thus dispelled.

This is, so far as I am aware, the fourth instance of the occurrence of this species in America. Those given by Professor Eaton are: Seattle, Washington, June, 1889, by Mr. C. V. Piper, and Catskill Mountains, New York, October, 1869, by Professor C. H. Peck. Specimens were also collected by Mr. J. B. Leiberg, in Idaho, Traille River basin, 1889 (BULL. TORR. CLUB, 1891, p. 49). It will thus be seen, that of the four known American stations, two are in New York State, and two in the extreme West.



B. indusiata occurs always on decayed logs, usually on coniferous ones, although my specimens were on some other wood. In my experience, *B. aphylla* occurs always on the ground, in high woods, on black moist earth, covered with a greenish confervoid growth.

ELIAS J. DURAND.

BOTANICAL DEPARTMENT, CORNELL UNIVERSITY.

Explanation of Figures.

Figure B1 was drawn from a dried specimen; the others from fresh material.

A1, *Buxbaumia indusiata.* Capsule, dorsal aspect × 7; A2, lateral aspect × 7; A3, spore × 290.

B1, *Buxbaumia aphylla.* Capsule, dorsal aspect × 7; B2, lateral aspect of same × 7; B3, spore × 290.

The Mint Rust npon the Variegated Balm.—At a commercial greenhouse recently visited the writer was surprised to find a quantity of variegated or silver balm (*Melissa officinalis*) infested with the mint rust *Puccinia Menthæ* Pers.). This fungus is one of the most common and widespread of all the genuine rusts, having no less than thirty species of hosts scattered through the following and other genera of the Labiatæ, namely: *Mentha, Thymus, Calamintha, Nepeta, Cunila, Monarda, Hedeoma,* the leading American host genera being *Mentha, Pycnanthemum* and *Monarda.*

As Dr. Burrill notes* the American form of the species is markedly different from the European in the echinulate teleutospores. It is this forma *Americana,* as Saccardo styles it, that infests the *Melissa.*

The host is an Old World species, and it is interesting to note that it has adopted the American style, so to speak, for its form of rust. The same is true of the *Mentha piperita* (peppermint), the only other member of the mint family that the writer has seen badly attacked by the rust while growing under glass.

There is a large field for this rust within the greenhouse should it spread to one or more of a long list of the members of the mint family. The *Coleus* alone, in all its great number of popular varieties, might, in becoming a victim to *Puccinia Menthæ,* cause as much alarm among commercial and other gardeners as the rust of the hollyhock or of the carnation.

There seems to be no choice whatever on the part of the parasite between the etiolated and green parts of the balm leaves as far as one may judge from the even distribution of the rust sori. This is as might be expected, for the *Puccinia* is a deep, wide feeder throughout the tissues of the host, and fruiting is the last stage of its growth.

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* Parasitic Fungi of Illinois p. 190.

Authors, Saccardo, Winter, Cohn, Burrill and others make no mention of *Melissa* as a host for *Puccinia Menthæ* Pers.

BYRON D. HALSTED.

Ranunculus micranthus Nutt.—Having had good opportunities of observing this plant in the field, and of comparing it in life with *R. abortivus* L., I am fully satisfied that it should be restored to the full specific rank given it by its describer in 1838. It is normally a lower plant than *abortivus*, sometimes a foot and a half high, but usually under a foot, and often flowering from a simple stem barely three inches high. It is also more slender than *abortivus*, the base of the stem and petioles especially being weaker and more lax. The leaves, too, are not at all fleshy as in that species, and of a deeper, duller green, giving the plant a noticeably different appearance, which is further heightened by its pubescence, this feature being especially evident in young plants. The leaves throughout are smaller than in *abortivus*, the root leaves on longer petioles and never at all heart-shaped, but narrowed or rounded at the base, crenate-dentate to dentate-serrate, often entire below the middle. Stem leaves with much narrower divisions and sharper dentition than in *abortivus*. In the latter I find the much larger root-leaves always deeply heart-shaped or kidney-form, and sub-crenate or crenate around the entire outer margin. The flowers of the two plants differ noticeably on comparison. The petals of *micranthus* are much longer and narrower than in *abortivus*—linear, and at least three times longer than broad, instead of ovate or sub-ovate, and nearly as broad as long. The sepals also are narrower and abruptly contracted into a stalk-like base, instead of rounded or gradually narrowed at their attachment. The distinctness of the plants is also borne out by the fruit. In *micranthus* the fruit-heads are often larger than in *abortivus*, oblong instead of sub-globular, the achenes slightly smaller, not so closely sessile or so crowded, and in shape less prominently arched over towards the beak, which is rather more produced than in *abortivus*. When fresh they have a dull surface showing finely cellular under the lens and contrasting strongly with the bright green and shining achenes of *abortivus*. The receptacle of the fruit is in *micranthus* much longer than in *abortivus*—linear instead of oblong, and presents a noteworthy

differential character in being glabrous (sometimes a few hairs are found at the extreme tip) instead of hairy as in the contrasted plant, this feature reversing the character of the stem and leaves of the two species. *R. abortivus* thrives under widely different conditions, and is to be found equally at home on rocks, wooded banks, or in low grounds. *R. micranthus* is evidently a species adapted to a more narrow environment. I have found it growing only in light rich soil—often in black earth—which has lodged in depressions or crevices in rocks usually in exposed situations in high open woods. Such places it often occupies in close communities. I have occasionally found *abortivus* growing with it, the two plants showing not the slightest tendency to intergrade. Furthermore, *R. micranthus* comes into flower somewhat later than *abortivus*.

E. P. Bicknell.

Riverdale on Hudson, New York.

Proceedings of the Club.

Tuesday Evening, December 12th, 1893.

The President in the chair and twenty persons present.

The following report of the Instruction Committee for 1893 was presented and accepted:

Since the last report of this committee the courses of instruction then announced, commencing April 27 and ending June 29, have been given as follows:

Dr. Thomas Morong, who conducted the general course, states that his class consisted of 28 members, the greater part of them from this city. The interest of the members was excellent, as was the attendance until the latter part. Of the course more than three-fourths of the members were always present until about the middle of June, when the attendance fell off more than one-half, owing, according to information, to the removal of many of the members into the country.

Two excursions were made each week, and these were even more highly enjoyed and appreciated than the lectures. As a means of imparting direct and familiar instruction, and of meeting the practical difficulties of the students, such excursions are indispensable.

Only two candidates for diplomas presented themselves for examination at the close of the course, although several others have

since expressed their regrets that they did not do so. By each of the candidates about 80 per cent. of the questions were very satisfactorily answered, and diplomas were issued to them.

Mr. Henry Kraemer, who conducted the course in Microscopical Botany, reports that his class contained seven members and that ten lessons were given. An oral examination was conducted and four members were awarded diplomas.

Miss Effie A. Southworth read a paper entitled "A Review of the Nitrogen Question." Following an enumeration of the forms in which nitrogen was offered to the plant was a review of the early work by Boussingault and others, leading to the conclusion that free nitrogen was not available as plant food. Offered to the roots, plants prefer nitrates to ammonia salts. An examination of leguminous plants showed that they possessed peculiar qualities of absorbing nitrogen. This led to an examination of the tubercles found on their roots. After a review of the different theories concerning the nature and function of these tubercles it was stated as the present accepted notion that they are caused by infection by a fungus, and have some connection with the nitrogen producing qualities of the plants, that is, by symbiosis with the fungus the macrosymbiant can make use of more nitrogen than it otherwise could. This work on the tubercle was followed by a new investigation of the sources of nitrogen for plants in general. Dr. B. Frank has especially worked upon this subject, and come to the conclusion that all plants absorb the free nitrogen of the air, and that the early stage of growth before the full development of the foliage, in the time when nitrates are especially required, free nitrogen assimilation becoming established when full foliage appears.

The paper was discussed by Dr. Curtiss and Prof. Rusby, who pointed out that even if it were proven that all plants absorbed free nitrogen, it could not be that they would at any period become independent of nitrates, as the fertilization of crops by nitrates in all stages of growth was productive of good results.

Mr. T. H. Kearney, Jr., read a "Report on the Botanical Exploration of Southeastern Kentucky in 1893," illustrated by specimens. The colleetions included 323 species made in six weeks of August and September, six being new to Gray's Manual region, with one variety and probably one species new to science.

Reviews and Notes on Literature.

Introduction to Botany. V. M. Spalding, Professor of Botany in the University of Michigan. (Small 8vo. pp. 246, Boston and New York, D. C. Heath & Co., 1893).

Teachers of botany, both in colleges and preparatory schools, have for a long time felt the need of some improvement in the methods of preparatory work. Botany, as it is at present taught in the great majority of preparatory schools, is too much of a cut-and-dried subject; and the student, when he has completed the regulation twenty weeks' course, feels that he has completed the subject as well, and enters college with the idea that the study of botany means learning the shapes of leaves and pressing plants. He has hardly had a glimpse at the structure, the physiology, or the relationship of the plant whose Latin name he has tried in vain to memorize; and as for plants that do not bear flowers he may not know of their existence, below the ferns.

The University of Michigan has recently made botany one of the requisites of preparation for the courses in the Literary Department. But the inevitable trouble of poor preparation arose, and to meet this need Prof. Spalding has issued a text-book, which covers the ground that, in his opinion, should be gone over in the high school. It is the product of a long experience in teaching, both in high school and college, and its author has for some time had the advantage of putting his methods to a practical test.

The book is primarily designed to teach the student to study nature for himself, and to do this the author makes use of the laboratory method. The chapters on organography include most of the subjects treated of in Gray's Lessons, and something of the structure of the different organs as well, but they are guides to laboratory study rather than descriptions and classifications of organs.

The systematic part is even more of a departure from the ordinary methods than the morphological. The student is introduced to some of the important families by a careful study of one or more species; he is then expected to compare this species with others of different genera, and so gain a conception of the family.

Plant analysis, in the sense of tracing the name by means of an artificial key, is not included, but the student who has gone through with the work laid out will be able to use Gray's Manual with perfect ease, and in most cases will know the order of a plant even without its use. There are several chapters which give a slight insight into the cryptogamic orders. In order to follow them all the compound microscope will be needed.

The book is not intended to supplant but to supplement others. On nearly every page the student is referred to other text-books, and it will be impossible for him to carry out the author's design without a knowledge of Gray's Lessons and some acquaintance with Darwin and Müller. If it can be adopted in our high schools it will give new life to the beginning of botanical study. The principal drawbacks to its use will be in finding high school teachers who are capable of carrying it out, and schools that are able and willing to incur the expense of fitting up a laboratory. E. A. S.

Botany of the Death Valley Expedition.—A Report on the Botany of the Expedition sent out in 1891 by the United States Department of Agriculture to make a Biological Survey of the region of Death Valley, California. Frederick Vernon Coville. (Contrib. U. S. Nat. Herb. Vol. 4, 318 pages, 21 plates and a map. Washington, 1893).

"In 1886 and subsequent years appropriation was made by Congress for a study of the geographic distribution of animals, to be conducted by the Division of Ornithology and Mammalogy, United States Department of Agriculture. In the year 1890 the scope of the work was enlarged by act of Congress so as to include the distribution of plants as well as animals, and in accordance with this provision the writer was temporarily detailed from the Division of Botany as botanist of the Death Valley Expedition, the first of the biological surveys under the new act."

The foregoing extract from Mr. Coville's preface indicates the origin of the fine piece of work now so successfully accomplished. The subject-matter is presented under the following heads: (1.) Itinerary. (2.) Principles of plant distribution. (3.) Distribution of plants in Southeastern California. (4.) Characteristics and adaptations of the desert flora. (5.) Catalogue of species. (6.) Catalogue of specimens. (7.) Bibliography. The principles

of nomenclature recommended by the Botonical Club of the American Association for the Advancement of Science have been followed. The whole number of species and varieties recorded is 1,261, 42 of which are new to Science. Some of these have previously been described by Mr. Coville in a paper published in the Proceedings of the Biological Society of Washington ;* those here first described are *Aquilegia pubescens*, *Ceanothus pinetorum*, *Lotus Argensis*, *Astragalus eremicus* Sheldon, *Astragalus Inyoensis* Sheldon, *Astragalus Panamintensis* Sheldon, *Astragalus Virgineus* Sheldon, *Gayophytum eriospermum*, *Œnothera xylocarpa*, *Cymopterus Panamintensis* Coulter and Rose, *Phlox austromontana*, *Navarretta setiloba*, *Nemophila spathulata*, *Phacelia hispida brachyantha*, *Cryptanthe recurvata*, *Mohavea breviflora*, *Pentstemon fruticiformis*, *Boerhavia annulata*, *Atriplex Tularensis*, *Eriogonum brachyanthum*, *Eriogonum nivale*, *Phyllogonum luteolum*, *Juncus orthophyllus*, *Ephedra viridis*, *Uromyces bicolor* Ellis and *Phleospora Bigloviæ* Ellis.

Two new genera are proposed : *Orechænactis*, based on *Chænactis thysanocarpha* A. Gray, in the Compositæ and *Phyllogonum* in the Polygonaceæ, based on a newly-discovered species.

The list of plants collected is enriched by numerous valuable notes on habit, habitat, distribution, additional characterizations, modifications of former descriptions and nomenclature. The plates illustrate many of the new species. They are lithographed and well executed.

Altogether the book is a most important contribution to American botany, and we feel sure that in extending to Mr. Coville our congratulations on its completion that we are but voicing the sentiments of all American botanists. N. L. B.

Contributions to the Life Histories of Plants, No. 9. Thomas Meehan (Proc. Acad. Nat. Sci. Phila. 1893, 289–309).

Mr. Meehan's ninth collection of notes under this caption includes memoranda on a Monœcious Case of *Populus tremuloides ;* Extra-axillary Branching in *Mertensia maritima ;* Dichotomous Branching in *Spergularia media ;* Missing Verticil in *Glaux maritima ;* The Relation between Rythmic Growth and Variety in

*Vol. 1 : 65–80 (1892).

Citrus Fruits; Morphology of the Stipule in *Comarum palustre*; Fertilization of *Malva rotundifolia;* the Peduncle of *Brunella vulgaris;* Branching of *Euphorbia hypericifolia* and *E. maculata;* Dimorphic Forms of *Lythrum Salicaria;* Structure of Florets in *Bidens bipinnata;* Rythmic Growth in Flowers of *Heliopsis lævis;* Floccose Leaves of *Antennaria plantaginifolia;* Endurance of *Portulaca oleracea;* Early Fertilization of *Scutellaria galericulata* and Fertilization of *Trifolium pratense.*

Enumeratio Myrtacearum Brasiliensium. Hjalmar Kiærskow. 8 vo. pp. 199, tab. 24. Christiania, 1893).

This is an enumeration, with descriptions of many new species, of the Myrtaceæ collected in Brazil by Glaziou, Lund, Mendonca, Raben, Reinhardt, Schenck, Warming and others, and forms the thirty-ninth paper in Professor Warming's contributions to the Botany of Central Brazil. Four hundred and nineteen species are recognized. The author's treatment of the order differs from that of Berg, in Martius' "Flora Brasiliensis," chiefly in the recognition of fewer genera, nearly all of the species proposed by Berg being maintained. The illustrations are made up partly from drawings and partly from reproductions of photographs of herbarium specimens. N. L. B.

Index to Recent Literature relating to American Botany.

Bailey, L. H. Another side of the Nomenclature Question. Erythea **2**: 10–12. 2 Ja. 1894.
Relations of nomenclature to horticulture.

Blochman, Ida M. Californian Herb-lore.—III. Erythea **2**: 9, 10. 2 Ja. 1894.
Saponaceous plants of Southern California.

Davidson, Anstruther. Californian Field Notes.—I. Erythea **2**: 1–2. 2 Ja. 1894.
Notes on *Calochortus.* Reduces *C. Lyoni* to *C. Catalinæ.*

Greene, Edw. L. Correct Nomenclature, etc. Erythea **2**: 12, 13. 2 Ja. 1894.

Greene, Edw. L. Dr. Britton and Mr. Britten and *Jacksonia.* Erythea **2**: 6–9. 2 Ja. 1894.
Maintains *Jacksonia* Raf. in place of *Polanisia* Raf.

Hill, E. J. *Viola palmata* Linn.—Meehan's Month. **4**: 4. Ja. 1894.
Notes on the variations of *V. palmata*, *V. sagittata* and *V. pedatifida* in the vicinity of Chicago, Ill.

Jepson, Willis L. Teratological Notes. Erythea **2**: 14, 15. 2 Ja. 1894.

(**Meehan, Thomas.**) *Sarracenia variolaris*. Meehan's Month. **4**: 1–2. Ja. 1894.
Colored illustration of *S. variolaris*.

Michener, C. Publication of Varieties. Erythea **2**: 13, 14. 2 Ja. 1894.

Michener, C. R. & P. Erythea **2**: 3–5. 2 Ja. 1894.
Brief account of labors of Ruiz and Pavon and a few species described by them.

Pringle, C. G. The Mexican Ash. Gard. & For. **7**: 14. 10 Ja. 1894.
Note on *Fraxinus Berlandieriana*.

Sargent, C. S., Editor. The Cocoanut tree. Gard. & For. **7**: 13–14. 10 Ja. 1894.
With illustration of a group of trees at Key West, Fla.

Sargent, C. S., Editor. The Red Mulberry tree. Gard. & For. **7**: 23. 17 Ja. 1894.
With illustration of *Moras alba* in *Alabama*.

Sargent, C. S., Editor. Josiah Gregg. Gard. & For. **7**: 12. 10 Ja. 1894.
Recollections of the life and work of Josiah Gregg from a letter written by Dr. Bigelow.

Trelease, W. Sugar Maples, and Maples in Winter. Fifth Ann. Rep. Missouri Bot. Gard. Reprint, 1–19, *pl. 1–16*. 1 Ja. 1894.

Trelease, W. The North American Species of *Gayophytum* and *Boisduvallia*. Fifth Ann. Rep. Missouri Bot. Gard. Reprint, 1–16, *pl. 1–26*. 5 Ja. 1894.

AMORPHA VIRGATA SMALL.

HIERACIUM SCRIBNERI SMALL.

MEEHANIA CORDATA (NUTT.) BRITTON.

Contributions from the Herbarium of Columbia College.

No. 1. A Preliminary List of North American species of *Cyperus*, with Description of New Forms. By N. L. Britton (1886), ... 25 cents.

No. 2. *Cerastium arvense*, L., and its North American Varieties. By Arthur Hollick and N. L. Britton (1887). (Out of print.)

No. 3. Plant Notes from Temiscouata County, Canada. By J. I. Northrop (1887). (Out of print.)

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Address

DR. THOS. MORONG,

Curator of the Herbarium, Columbia College,

NEW YORK CITY.